

INTERNATIONAL COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

To:

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DB 783 PCT
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IMPORTANT NOTIFICATION

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24 juillet 2000 (24.07.00)

1. The following indications appeared on record concerning:

the applicant the inventor the agent the common representative

Name and Address	State of Nationality	State of Residence
GIUSTINI, Delio Siemens Information and Communication Networks S.p.A. Cascina Castelletto I-2019 Settimo Milanese Italy	Telephone No. 39 02 27338701	Facsimile No. 39 02 27338703
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2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

the person the name the address the nationality the residence

Name and Address	State of Nationality	State of Residence
GIUSTINI, Delio Siemens Information and Communication Networks S.p.A. Palazzo Gorky Via Monfalcone, 1 I-20092 Cinisello Balsamo Italy	Telephone No. 39 02 27338701	Facsimile No. 39 02 27338703
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer François BAECHLER Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT**NOTIFICATION OF ELECTION**
(PCT Rule 61.2)

Date of mailing (day/month/year) 29 May 2001 (29.05.01)	To: Commissioner US Department of Commerce United States Patent and Trademark Office, PCT 2011 South Clark Place Room CP2/5C24 Arlington, VA 22202 ETATS-UNIS D'AMERIQUE in its capacity as elected Office
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International application No. PCT/EP00/07120	Applicant's or agent's file reference DB 783 PCT
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International filing date (day/month/year) 24 July 2000 (24.07.00)	Priority date (day/month/year) 27 August 1999 (27.08.99)
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Applicant

DE ANGELI, Alfonso et al

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

16 February 2001 (16.02.01)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer
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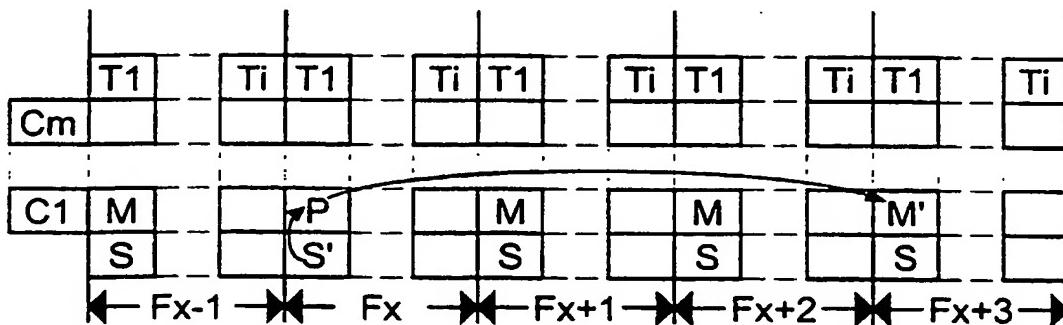
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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(54) Title: METHOD AND SYSTEM TO SYNCHRONIZE MOBILE UNITS TO A BASE TRANSCEIVER STATION



WO 01/17137 A1

(57) Abstract: Method to synchronize at least one mobile unit to at least one base transceiver station belonging to a digital telecommunication network, in which radio signals transmitted and received by said base station are subdivided in frames (Fx) having pre-determined duration and each frame is subdivided in a pre-determined number of timeslots (Tn) and codes (Cn), said signals including at least a synchronization signal (S), which is transmitted by the base transceiver station and includes a sequence of modulation elementary units suitable to identify the timeslot (T1) and the code (C1) of a service channel containing system messages (M), said method including the following operational steps: marking the synchronization signal (S) in at least one frame (Fx) by the base transceiver station; transmitting a pointer message (P) in the service channel of said frame (Fx) or of a subsequent frame (Fx+n) by the base transceiver station; detecting the marked synchronization signal (S') by the mobile unit; receiving the pointer message (P) by the mobile unit; extracting from the pointer message (P) the position of at least one system message (M') by the mobile unit. The present invention relates also to a system implementing this method.

«METHOD AND SYSTEM TO SYNCHRONIZE MOBILE UNITS TO A BASE TRANSCEIVER STATION»

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Field of the Invention

The present invention relates to a method to synchronize mobile units to base transceiver stations in digital telecommunication networks, in particular with time division duplex access (TDD), such as for instance mobile telecommunication networks belonging to the UMTS standard (*Universal Mobile Telecommunication System*), both in the TDD-CDMA version (*Time Division Duplex- Code Division Multiple Access*) proposed by the 3GPP organization (*3rd Generation Partnership Project*) and in the TD-SCDMA version (*Time Division – Synchronous Code Division Multiple Access*) proposed by the CWTS organization (*Chinese Wireless Telecommunication Standards*). The present invention relates also to a system implementing this method.

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It is known that in mobile telecommunication networks with TDD access the transmission and reception of radio signals from and to the base stations, called BS in UMTS environment, do not occur at the same time, but are alternated in a continuous sequence of periods having predefined duration, each one of them, called *frame*, is conveniently coded and identified by the system. For instance, the UMTS base transceiver stations generally transmit the signals to the mobile units, called UE (*User Equipment*), in the first half of the frame or semiframe (*downlink* procedure), and receive in the second half frame the signals transmitted by the user equipment itself (*uplink* procedure). In particular, each frame lasts 10 ms, subdivided into a plurality of time intervals (*timeslots*), they too having predefined duration, while the two semi frames can have equal or different duration.

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Inside each timeslot the reception/transmission of the useful signal occurs according to the time division access technique called TDMA (*Time Division Multiple Access*). Moreover, in each timeslot a plurality of signals can be code division multiplexed according to the CDMA access technique (*Code Division Multiple Access*), so that each radio channel is defined by a particular timeslot and one or more particular access codes.

It is therefore clear that to avoid dangerous interference between the base

- 2 -

transceiver stations and user equipments and/or to optimize the communication transfer from a base station to another one, according to a procedure called *handover*, it is necessary that frames are synchronized among them, in order to be able to separate the transmission and reception periods of user equipment from those of base stations and
5 vice versa. Moreover, it is convenient that also the sequences of digital codes associated to each frame, which are cyclically repeated in time, match during the communications, in order to be able to speed up the above mentioned *handover* procedure in the user equipment. This last synchronization type is called *multiframe synchronisation*. An additional synchronization level, called *superframe*, consists in the numbering of
10 multiframe through sequences which are cyclically repeated in time. Through the hierarchical subdivision of superframes into multiframe and frames, it is therefore possible to define a plurality of service channels whose collocation inside a particular multiframe and/or superframe is known in advance.

To allow the user equipments to synchronize, the base transceiver stations
15 transmit a synchronization signal in a particular channel called SCH (in 3GPP environment) or SYNC (in CWTS environment), which is coded in a different manner from the other channels, superimposing to them in a non-orthogonal mode. In this way the user equipment can easily distinguish the synchronization channel from the remaining channels even in noisy electromagnetic environment.

20 In particular, the synchronization signal includes a sequence of modulation elementary units, called *chips*, showing best self-correlation and cross-correlation properties in order to be easily identified by user equipment. This sequence allows to identify the group of codes of the specific base transceiver station, as well as the position in the frame, that is the timeslot and the access codes, of a particular service
25 channel called *broadcast* or CCPCH (*Common Control Physical Channel*). This service channel contains the system messages necessary to the user equipment to have access to network services, such as for instance the operator and cell identifiers, the type of services available, the incoming call (*paging*) and other messages.

However, considering the limited capacity of each radio channel, said system
30 messages shall be often subdivided into several segments or *bursts* that are transmitted in more time multiplexing consecutive frames. This means that for a correct reconstruction of the message, the user equipment have to assemble the different

segments received, re-composing the same in accordance with the transmission order. Since the service channel can transmit different types of system messages, it is necessary to identify the type of each message in order that the user equipment can perform the correct decoding and possibly reject in advance the messages considered 5 not interesting, in this way reducing the use of the available resources and therefore the consumption.

Back ground art

The identification of the type of system message transmitted by base stations can be made adding a header, which however reduces the neat capacity of the transmission 10 channel, or associating the type of message to the frame number where it is placed, but this requires to unprofitably code in permanent manner the time multiplexing of the messages in the multiframe.

Scope and summary of the Invention

Scope of the present invention is therefore that to indicate a method and a 15 synchronization system, free from the above mentioned drawbacks. Said scope is attained with a method and a system whose main characteristics are specified in claims 1 and 7, respectively, while other characteristics are specified in the appended claims.

Thanks to the marking of the synchronization signal and to the transmission of a particular pointer message, both executed by the base transceiver station, the method 20 according to the present invention allows to reduce the power consumption of the user equipment, since it is possible to optimize the listening time of system messages avoiding the examination of the messages considered not interesting by the user equipment.

A further advantage of the method according to the present invention consists in 25 optimizing not only the listening times, but also the transmission capacity of system messages, since it is possible to mark the messages in the service channel without transmitting header which would reduce the transmission capacity.

An additional advantage of the method according to the present invention is represented by the possibility to extend or increase the kinds of system messages 30 without modifying the structure of the physical channels, as well as by the robustness due to the use of the synchronization physical channel to point to a logic channel which in turn points to other logic channels, thus availing of the easy reception of the

synchronization channel itself.

According to a particular aspect of the method of the present invention, the marking of the synchronization signal transmitted by a base transceiver station can be used also to synchronize in multiframe other base transceiver stations capable of
5 directly receiving said signal.

According to another particular aspect of the method of the present invention, the marking of the synchronization signal by the base transceiver station includes one or more consecutive polarity inversions of the relevant modulation elementary units. In this way, the best self-correlation and cross-correlation properties of the synchronization
10 signal are not decreased, thus maintaining its easy reception unchanged, particularly in noisy electromagnetic environments.

Moreover, the method according to the present invention can be easily implemented with least modifications to the known telecommunication systems, since the implementation of the relevant operational steps in the base transceiver stations and
15 in user equipment requires only *software* but not *hardware* modifications.

Brief description of the drawings

The present invention together with further advantages and characteristics thereof may be understood by those skilled in the art making reference to the following detailed description taken in conjunction with the accompanying drawings in which:

- 20 – figure 1 shows a partial diagram of the structure of radio channels in a first embodiment of the method according to the present invention; and
- figure 2 shows a partial diagram of the structure of radio channels in a second embodiment of the method according to the present invention.

Detailed description of some preferred embodiments of the invention

25 With reference to figure 1, we can notice that in a first embodiment of the method according to the present invention at least one base station transmits the radio signals that can be received by one or more user equipment in the known manner, and vice versa. Said signals are subdivided into a plurality of frames Fn, for instance Fx-1, Fx, Fx+1, Fx+2, Fx+3, in their turn subdivided into a plurality of timeslots Tn, for instance from T1 to Ti, and into a plurality of access codes Cn, for instance from C1 to Cm.
30 Furthermore, the base transceiver stations transmit a synchronization signal S in a coded channel in a manner different from the other channels, for instance phase modulating

- 5 -

the radio carrier according to the BPSK technique (*Binary Phase Shift Keying*).

This synchronization signal S includes in the known way a sequence of modulation elementary units, enabling to identify the group of codes of the specific base transceiver station, as well as the timeslot and access codes, for instance the timeslot T1
5 and code C1 of the service channel containing the system messages M necessary to the user equipment to have access to network services. To obtain the content of messages M, often subdivided into segments transmitted in more consecutive frames, the user equipment receive and decode the signal S.

In the first embodiment of the method according to the present invention, the base
10 station conveniently modifies the sequence of modulation elementary units of the synchronization signal S in a frame Fn, for instance in the frame Fx, to the purpose of signaling to user equipment the presence of a particular pointer message P in the service channel of the same frame or of a subsequent frame whose position is known in advance.

15 The pointer message P, which preferably occupies one sole frame to speed up the acquisition time, contains in its turn the frame synchronisms of higher hierarchical order, that is the information relevant to the multiframe and possibly to the superframe. This information enables to know when the first segment of a new system message starts and therefore determine the position, for instance in the frame Fx+3, of a
20 particular system message M', which in its turn can be subdivided into more consecutive frames. The user equipments, on reception of the synchronization signal S' marked by the modified sequence of modulation elementary units, decode the pointer message P and possibly examine, whether interesting, the system message M' pointed by the pointer message P.

25 In particular, in the present embodiment the marking of the sequence of modulation elementary units is obtained modulating the sequence of signal S with logic coefficient -1, that is, inverting its polarity. The detection of polarity of the sequence marked S' in the synchronization channel can coherently occur, averaging the polarities of more subsequent frames to reduce possible errors, or incoherently, making a
30 difference between the polarities of two subsequent frames.

With reference to figure 2, we see that a second embodiment of the method according to the present invention differs from the first embodiment in that the

- 6 -

synchronization signal marked S' indicates to the user equipments the presence of the pointer message P in the service channel of a frame F_{x+n} following the one where the signal marked S' is present (in the example n = 1). In the following frame F_{x+n+1}, this signal, instead of returning to the original state S, for instance at non inverted polarity,
5 remains in the modified state S' until it is necessary to indicate the presence of another pointer message P. Therefore, in the present embodiment, the presence of pointer messages P is indicated by the base station to the user equipments through a transition of the status of the synchronization signal. In the figures, arrows indicate the pointing from signals marked S' to pointer messages P, as well as from pointer messages P to the
10 first segment of the new system messages M'.

In another embodiment of the method according to the present invention the marking of the synchronization signal S by the base transceiver station occurs with multiple periodicity versus its own multiframe period. In this way, the marking of the synchronization signal transmitted by a base transceiver station can be used also to synchronize in multiframe other base transceiver stations capable of directly receiving said signal.
15

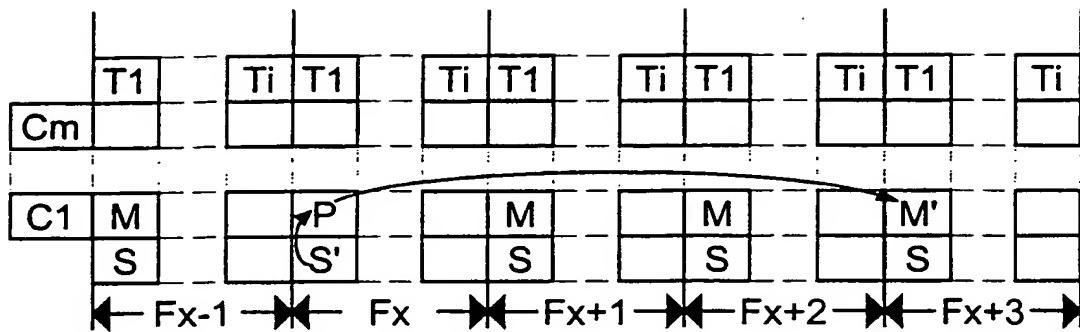
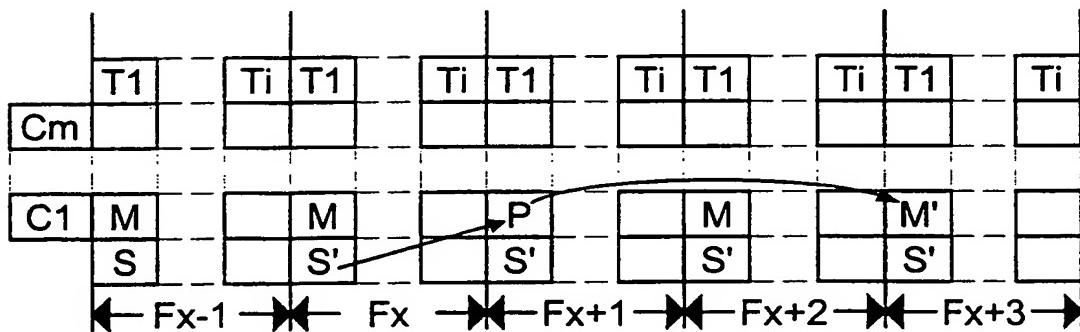
The method according to the present invention can also be applied to the particular mechanism of system messages transmission on the service channel, which has been proposed in the 3GPP. In said field, system messages are sent in blocks that
20 can have each, different characteristics, such as for instance the repetition speed. Among said block, a *master* block is defined, listing and describing all the blocks currently in use in the base station, and gives also a method to determine when any information is updated. The marking of the synchronization signal S and the transmission of the pointer message P could, in this case, enable the user equipments to
25 quickly identify the *master* block and consequently perform an effective acquisition of all the necessary system information.

Therefore, while an embodiments of the present invention has been shown and described, it should be understood that other embodiments and/or additions thereto, in particular in the marking algorithm of the synchronization signal S, can be made by
30 those skilled in the art without departing from the scope thereof.

CLAIMS

1. Method to synchronize at least a user equipment to at least one base transceiver station belonging to a digital telecommunication network, in which radio signals transmitted and received by said base station are subdivided into frames (Fn) having predefined duration and each frame is subdivided into a predefined number of timeslots (Tn) and codes (Cn), said signals including at least a synchronization signal (S), which is transmitted by the base transceiver station and contains a modulation elementary units sequence suitable to identify the timeslot (T1) and the code (C1) of a service channel containing a system messages (M),
characterized in that it includes the following operational steps:
 - marking the synchronization signal (S), in at least one frame (Fx), by the base transceiver station;
 - transmitting a pointer message (P) in the service channel of such frame (Fx), or of a subsequent frame (Fx+n), by the base transceiver station;
 - detecting the marked synchronization signal (S') by the mobile unit;
 - receiving the pointer message (P) by the mobile unit;
 - extracting from the pointer message (P) the position of at least a system message (M') by the mobile unit.
2. Method according to the previous claim, characterized in that the marking of the synchronization signal (S) by the base transceiver station includes at least a polarity inversion of the relative modulation elementary units.
3. Method according to the previous claim, characterized in that the marking of the synchronization signal (S) by the base transceiver station includes two polarity inversions of the relative modulation elementary units in two consecutive frames (Fx, Fx+1).
4. Method according to one of the previous claims, characterized in that the extraction from the pointer message (P) of the position of at least a system message (M') includes the decoding of the frame number of such system message (M').
5. Method according to the previous claim, characterized in that the extraction from the pointer message (P) of the position of at least a system message (M') includes

- the decoding of the multiframe number of such system message (M').
6. Method according to any claim 1 to 3, characterized in that the marking of the synchronization signal (S) by the base transceiver station takes place with periodicity multiple of its own multiframe period.
- 5 7. System to synchronize at least one user equipment to at least one base transceiver station belonging to a digital telecommunication network, in which radio signals transmitted and received from said base station are divided into frames (Fn) having predefined duration and each frame is subdivided in a predefined number of timeslots (Tn) and codes (Cn), said signals including at least a synchronization signal (S) which is transmitted by the base transceiver station and includes a sequence of modulation elementary units suitable to identify the timeslot (T1) and the code (C1) of a service channel containing system messages (M), characterized in that it includes at least a base transceiver station with means adapted:
- 15 • to mark the synchronization signal (S) in at least one frame (Fx), and
 • to transmit a pointer message (P) in the service channel of this frame (Fx) or of a subsequent frame (Fx+n).
8. System according to the previous claim, characterized in that it includes at least a user equipment with means adapted:
- 20 • to detect the marked synchronization signal (S') from said base transceiver station;
 • to receive the pointer message (P) transmitted by said base transceiver station, and
 • to extract from the pointer message (P) the position of at least a system message (M').
- 25 9. System according to claim 7 or 8, characterized in that it includes an additional base transceiver station adapted to detect the marked synchronization signal (S'), and synchronize in multiframe with said first base transceiver station through such marked synchronization signal (S').
- 30 10. System according to any claims 7 to 9, characterized in that it is adapted to implement the method according to any claims 1 through 6.

**Fig. 1****Fig. 2**

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/07120

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H04B7/26 H04J3/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 H04B H04J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DAHLMAN E ET AL: "UMTS/IMT-2000 BASED ON WIDEBAND CDMA" IEEE COMMUNICATIONS MAGAZINE, IEEE SERVICE CENTER, PISCATAWAY, N.J., US, vol. 36, no. 9, 1 September 1998 (1998-09-01), pages 70-80, XP000784828 ISSN: 0163-6804 page 75, left-hand column, line 49 -right-hand column, line 17 page 76, right-hand column, line 46 -page 77, right-hand column, line 32 --- -/-</p>	1-10

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

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- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

22 November 2000

Date of mailing of the international search report

22/12/2000

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/07120

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 098 834 A (STANDARD TELEPHONES CABLES LTD) 24 November 1982 (1982-11-24) abstract page 1, line 5-10 page 1, line 43-80 page 1, line 126 -page 2, line 26 page 3, line 7-16 --- US 5 930 366 A (JAMAL KARIM ET AL) 27 July 1999 (1999-07-27) abstract column 4, line 66 -column 5, line 24 column 5, line 61 -column 6, line 57 column 13, line 55-63 claims --- EUROPEAN TELECOMMUNICATIONS STANDARD INSTITUTE (ETSI): "Universal Mobile Telecommunications System (UMTS); UMTS Terrestrial Radio Access (UTRA); Concept evaluation (UMTS 30.06 version 3.0.0)" ETSI, December 1997 (1997-12), XP002131074 page 8, line 6-18 page 10, line 1-6 page 10, line 15 -page 11, line 11 page 11, line 29-37 --- ZHANG PING ET AL: "Studies on wideband CDMA system" ICCT'98. 1998 INTERNATIONAL CONFERENCE ON COMMUNICATION TECHNOLOGY. PROCEEDINGS (IEEE CAT. NO.98EX243), ICCT'98. 1998 INTERNATIONAL CONFERENCE ON COMMUNICATION TECHNOLOGY. PROCEEDINGS, BEIJING, CHINA, 22-24 OCT. 1998, pages 484-489 vol.1, XP002153484 1998, Beijing, China, Publishing House of Constr. Mater, China ISBN: 7-80090-827-5 page 486, left-hand column, line 7 -page 488, left-hand column, line 5 ---	1-10 1-10 1-10 1-10 1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 00/07120

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
GB 2098834	A 24-11-1982	AU	544899 B	20-06-1985
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US 5930366	A 27-07-1999	AU	8896498 A	22-03-1999
		BR	9812033 A	26-09-2000
		EP	1010256 A	21-06-2000
		WO	9912273 A	11-03-1999
		ZA	9807254 A	15-02-1999

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

DELIO, Giustini
SIEMENS INFORMATION AND
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PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing
(day/month/year) 19.11.2001

Applicant's or agent's file reference

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IMPORTANT NOTIFICATION

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PCT/EP00/07120

International filing date (day/month/year)
24/07/2000

Priority date (day/month/year)
27/08/1999

Applicant

SIEMENS INFORMATION AND COMMUNICATION NETWORKS SPA

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference DB 783 PCT	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP00/07120	International filing date (day/month/year) 24/07/2000	Priority date (day/month/year) 27/08/1999
International Patent Classification (IPC) or national classification and IPC H04B7/26		
<p>Applicant SIEMENS INFORMATION AND COMMUNICATION NETWORKS SPA</p> <p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p> <p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input checked="" type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 		
Date of submission of the demand 16/02/2001	Date of completion of this report 19.11.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Staeger, R Telephone No. +49 89 2399 8124	



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/07120

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):
Description, pages:

1-6 as originally filed

Claims, No.:

1-10 as originally filed

Drawings, sheets:

1/1 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/07120

- the drawings, sheets:
5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c));
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)
6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-10
	No: Claims
Inventive step (IS)	Yes: Claims 1-10
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-10
	No: Claims

**2. Citations and explanations
see separate sheet**

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07120

V. Reasoned statement with regard to novelty and inventive step:

0. Reference is made to the following documents:

D1: DAHLMAN E ET AL: 'UMTS/IMT-2000 BASED ON WIDEBAND CDMA'
IEEE COMMUNICATIONS MAGAZINE, IEEE SERVICE CENTER, PISCATAWAY,
N.J.US, vol. 36, no. 9, 1 September 1998 (1998-09-01), pages 70-80,
XP000784828 ISSN: 0163-6804

D2: US-A-5 930 366 (JAMAL KARIM ET AL) 27 July 1999 (1999-07-27)

D3: EUROPEAN TELECOMMUNICATIONS STANDARD INSTITUTE (ETSI):
'Universal Mobile Telecommunications System (UMTS); UMTS Terrestrial Radio
Access (UTRA); Concept evaluation (UMTS 30.06 version 3.0.0)' ETSI,
December 1997 (1997-12), XP002131074

- 1.) The present application relates to a method to synchronize mobile units to base transceiver stations in telecommunication networks, in particular with time division duplex access.

In prior art methods as cited in the description page 2, l. 14 to p. 3, l. 12 the base stations transmit a synchronization signal coded in a different manner from the other channels, but superimposing to them or a header added in front of the synchronization signal. Both reduces the capacity of the transmission channel.

2.) Problem:

To provide a system and method free from the above mentioned drawbacks.

3.) Solution:

The features which render the independent claims 1 and 7 inventive, are the following:

The method and system (see also figures 1-2) to synchronize at least one user equipment to at least one base station by the disclosed downlink operation by transmitting and marking a synchronisation signal (S) in at least one frame (Fx) to indicate the presence of a pointer message (P) in the same frame (Fx) or a subsequent frame (Fx+n), transmitting a pointer message (P) in the service channel of the same frame or of the subsequent frame, the user equipment receiving the marked synchronization signal (S') and the pointer message (P),

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07120

detecting the marked synchronisation symbol, extracting from the pointer message the position of at least a system message (in a multiframe? or frame? or slot? or?).

- 4.) None of the documents of the Search Report gives such a providing of synchronization signals and system messages.
- 5.) However, there remain clarity objections as indicated below.

VII Certain defects in the international application:

1. To meet the requirements of Rule 5.1(a)(ii) PCT, the most relevant of the documents D1-D3 should have been identified in the description and the relevant background art disclosed therein should have been briefly discussed in comparison to the present application.
2. A document reflecting the prior art described on p. 3, l. 8-12, is not identified in the description (Rule 5.1(a)(ii) PCT). It seems that D3, figure 7 could be such a document.
3. It could be helpful for the further examination process if the applicants could indicate on which document the two part form is based on.
4. If necessary, the description should have been adapted to correctly reflect any changes in the scope of the claimed invention.

VIII Certain observations:

- 1a. In claim 1, l. 1 and 15-18 there should be used either the consistent terminology "user equipment" or "mobile unit". The present formulation leads to undefined antecedents for "the mobile unit" of lines 15-18.
- b. (i) From the formulation of claim 1, l. 11 and 15, claim 7, l. 15 and claim 8, l. 20-

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07120

21 it remains unclear which information is provided by the marked synchronization signal and thereby leads to an uncertain scope.

(ii) Moreover, description p. 5, l. 9-14; p. 6, l. 1-3, l. 6-8 and figures 1-2 convey the impression that the synchronization of the system can only be carried out in a particular way, namely by a marked synchronization signal **indicating to the user equipment the presence of a pointer message in the service channel of the same frame or of a subsequent frame**. There is no system disclosed in description and figures with a marked synchronization signal, which is not indicating this information to the user equipment.

Hence, claims 1, 7 and 8, which are not containing this feature, are not supported by the description as required by Article 6 PCT.

To overcome these objections the applicants should consider to add the bold typed feature above to the independent claims.

c. In claim 1, l. 17 and claim 8, l. 24 the scope is uncertain, since for **the position** it is left unclear whereto it is related. It could be e.g. a time slot position in a frame, or a position of a frame in a multiframe or any other message position.

2. Although claim 7 is directed to **a system** to synchronize at least one user equipment to at least one base station, said claim 7 contains merely the features of the base station (l. 13-17).

However, the description and drawings convey the impression that the synchronization of the system can only be carried out in a particular way, namely by interaction between the base station transceiver means and those of the user equipment (see claim 1), and no means are envisaged where the system is synchronized by the base station alone.

Hence, claim 7 is not supported by the description as required by Article 6 PCT.

To overcome this objection the applicants should consider to add the features of claim 8 (related to the user equipment) to the system of claim 7 in a clarified manner.

3. The scope of dependent claim 10 is considered as completely unclear since: there are missing any technical apparatus features in said system claim.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07120

Said claim should either be deleted or apparatus features should be added giving details of the features of claims 7-9.

4. The vague and imprecise statement in the description on page 6, l. 27-30 implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them (see also the PCT Guidelines, PCT/GL/3 III, 4.3a).

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70) 5

Applicant's or agent's file reference DB 783 PCT	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP00/07120	International filing date (day/month/year) 24/07/2000	Priority date (day/month/year) 27/08/1999	
International Patent Classification (IPC) or national classification and IPC H04B7/26			
Applicant SIEMENS INFORMATION AND COMMUNICATION NETWORKS SPA			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 16/02/2001	Date of completion of this report 19.11.2001
Name and mailing address of the International preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Staeger, R Telephone No. +49 89 2399 8124



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/07120

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-6 as originally filed

Claims, No.:

1-10 as originally filed

Drawings, sheets:

1/1 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/07120

the drawings, sheets:

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Yes: Claims 1-10

No: Claims

Inventive step (IS) Yes: Claims 1-10

No: Claims

Industrial applicability (IA) Yes: Claims 1-10

No: Claims

**2. Citations and explanations
see separate sheet**

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07120

V. Reasoned statement with regard to novelty and inventive step:

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D1: DAHLMAN E ET AL: 'UMTS/IMT-2000 BASED ON WIDEBAND CDMA' IEEE COMMUNICATIONS MAGAZINE, IEEE SERVICE CENTER, PISCATAWAY, N.J.US, vol. 36, no. 9, 1 September 1998 (1998-09-01), pages 70-80, XP000784828 ISSN: 0163-6804

D2: US-A-5 930 366 (JAMAL KARIM ET AL) 27 July 1999 (1999-07-27)

D3: EUROPEAN TELECOMMUNICATIONS STANDARD INSTITUTE (ETSI): 'Universal Mobile Telecommunications System (UMTS); UMTS Terrestrial Radio Access (UTRA); Concept evaluation (UMTS 30.06 version 3.0.0)' ETSI, December 1997 (1997-12), XP002131074

- 1.) The present application relates to a method to synchronize mobile units to base transceiver stations in telecommunication networks, in particular with time division duplex access.

In prior art methods as cited in the description page 2, l. 14 to p. 3, l. 12 the base stations transmit a synchronization signal coded in a different manner from the other channels, but superimposing to them or a header added in front of the synchronization signal. Both reduces the capacity of the transmission channel.

2.) Problem:

To provide a system and method free from the above mentioned drawbacks.

3.) Solution:

The features which render the independent claims 1 and 7 inventive, are the following:

The method and system (see also figures 1-2) to synchronize at least one user equipment to at least one base station by the disclosed downlink operation by transmitting and marking a synchronisation signal (S) in at least one frame (Fx) to indicate the presence of a pointer message (P) in the same frame (Fx) or a subsequent frame (Fx+n), transmitting a pointer message (P) in the service channel of the same frame or of the subsequent frame, the user equipment receiving the marked synchronization signal (S') and the pointer message (P),

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07120

detecting the marked synchronisation symbol, extracting from the pointer message the position of at least a system message (in a multiframe? or frame? or slot? or?).

- 4.) None of the documents of the Search Report gives such a providing of synchronization signals and system messages.
- 5.) However, there remain clarity objections as indicated below.

VII Certain defects in the international application:

1. To meet the requirements of Rule 5.1(a)(ii) PCT, the most relevant of the documents D1-D3 should have been identified in the description and the relevant background art disclosed therein should have been briefly discussed in comparison to the present application.
2. A document reflecting the prior art described on p. 3, l. 8-12, is not identified in the description (Rule 5.1(a)(ii) PCT). It seems that D3, figure 7 could be such a document.
3. It could be helpful for the further examination process if the applicants could indicate on which document the two part form is based on.
4. If necessary, the description should have been adapted to correctly reflect any changes in the scope of the claimed invention.

VIII Certain observations:

- 1a. In claim 1, l. 1 and 15-18 there should be used either the consistent terminology "user equipment" or "mobile unit". The present formulation leads to undefined antecedents for "the mobile unit" of lines 15-18.
- b. (i) From the formulation of claim 1, l. 11 and 15, claim 7, l. 15 and claim 8, l. 20-

21 it remains unclear which information is provided by the marked synchronization signal and thereby leads to an uncertain scope.

(ii) Moreover, description p. 5, l. 9-14; p. 6, l. 1-3, l. 6-8 and figures 1-2 convey the impression that the synchronization of the system can only be carried out in a particular way, namely by a marked synchronization signal **indicating to the user equipment the presence of a pointer message in the service channel of the same frame or of a subsequent frame**. There is no system disclosed in description and figures with a marked synchronization signal, which is not indicating this information to the user equipment.

Hence, claims 1, 7 and 8, which are not containing this feature, are not supported by the description as required by Article 6 PCT.

To overcome these objections the applicants should consider to add the bold typed feature above to the independent claims.

- c. In claim 1, l. 17 and claim 8, l. 24 the scope is uncertain, since **for the position** it is left unclear whereto it is related. It could be e.g. a time slot position in a frame, or a position of a frame in a multiframe or any other message position.
2. Although claim 7 is directed to **a system to synchronize at least one user equipment to at least one base station**, said claim 7 contains merely the features of the base station (l. 13-17).
However, the description and drawings convey the impression that the synchronization of the system can only be carried out in a particular way, namely by interaction between the base station transceiver means and those of the user equipment (see claim 1), and no means are envisaged where the system is synchronized by the base station alone.
Hence, claim 7 is not supported by the description as required by Article 6 PCT.
To overcome this objection the applicants should consider to add the features of claim 8 (related to the user equipment) to the system of claim 7 in a clarified manner.
3. The scope of dependent claim 10 is considered as completely unclear since: there are missing any technical apparatus features in said system claim.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07120

Said claim should either be deleted or apparatus features should be added giving details of the features of claims 7-9.

4. The vague and imprecise statement in the description on page 6, l. 27-30 implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them (see also the PCT Guidelines, PCT/GL/3 III, 4.3a).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DB 783 PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/EP 00/ 07120	International filing date (day/month/year) 24/07/2000	(Earliest) Priority Date (day/month/year) 27/08/1999
Applicant SIEMENS INFORMATION AND COMMUNICATION NETWORKS SPA		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.
 It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
 - contained in the international application in written form.
 - filed together with the international application in computer readable form.
 - furnished subsequently to this Authority in written form.
 - furnished subsequently to this Authority in computer readable form.
 - the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. Certain claims were found unsearchable (See Box I).3. Unity of invention is lacking (see Box II).

4. With regard to the title,

- the text is approved as submitted by the applicant.
- the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- the text is approved as submitted by the applicant.
- the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

- as suggested by the applicant.
- because the applicant failed to suggest a figure.
- because this figure better characterizes the invention.

1

None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/07120

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B7/26 H04J3/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04B H04J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A ✓	<p>DAHLMAN E ET AL: "UMTS/IMT-2000 BASED ON WIDEBAND CDMA" IEEE COMMUNICATIONS MAGAZINE, IEEE SERVICE CENTER. PISCATAWAY, N.J,US, vol. 36, no. 9, 1 September 1998 (1998-09-01), pages 70-80, XP000784828 ISSN: 0163-6804 page 75, left-hand column, line 49 -right-hand column, line 17 page 76, right-hand column, line 46 -page 77, right-hand column, line 32 --- -/-</p>	1-10



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

22 November 2000

Date of mailing of the international search report

22/12/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
 Fax: (+31-70) 340-3016

Authorized officer

Dejonghe, O

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/07120

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 098 834 A (STANDARD TELEPHONES CABLES LTD) 24 November 1982 (1982-11-24) abstract page 1, line 5-10 page 1, line 43-80 page 1, line 126 -page 2, line 26 page 3, line 7-16 ----	1-10
A	US 5 930 366 A (JAMAL KARIM ET AL) 27 July 1999 (1999-07-27) abstract column 4, line 66 -column 5, line 24 column 5, line 61 -column 6, line 57 column 13, line 55-63 claims ----	1-10
A	EUROPEAN TELECOMMUNICATIONS STANDARD INSTITUTE (ETSI): "Universal Mobile Telecommunications System (UMTS); UMTS Terrestrial Radio Access (UTRA); Concept evaluation (UMTS 30.06 version 3.0.0)" ETSI, December 1997 (1997-12), XP002131074 page 8, line 6-18 page 10, line 1-6 page 10, line 15 -page 11, line 11 page 11, line 29-37 ----	1-10
A	ZHANG PING ET AL: "Studies on wideband CDMA system" ICCT'98. 1998 INTERNATIONAL CONFERENCE ON COMMUNICATION TECHNOLOGY. PROCEEDINGS (IEEE CAT. NO.98EX243), ICCT'98. 1998 INTERNATIONAL CONFERENCE ON COMMUNICATION TECHNOLOGY. PROCEEDINGS, BEIJING, CHINA, 22-24 OCT. 1998, pages 484-489 vol.1, XP002153484 1998, Beijing, China, Publishing House of Constr. Mater, China ISBN: 7-80090-827-5 page 486, left-hand column, line 7 -page 488, left-hand column, line 5 ----	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 00/07120

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
GB 2098834	A 24-11-1982	AU 544899	B	20-06-1985
		AU 8357482	A	18-11-1982
		BE 893178	A	16-11-1982
		CH 659747	A	13-02-1987
		DE 3217584	A	30-12-1982
		ES 512164	D	01-08-1983
		ES 8308182	A	01-11-1983
		US 4472811	A	18-09-1984
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US 5930366	A 27-07-1999	AU 8896498	A	22-03-1999
		BR 9812033	A	26-09-2000
		EP 1010256	A	21-06-2000
		WO 9912273	A	11-03-1999
		ZA 9807254	A	15-02-1999
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